AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry; and

detection means having a radiation sensitive surface capable of detecting [[the]]an intensity of incident radiation on the surface, the detection means being coupled to an output device that provides a measure of the intensity of the incident radiation;

wherein the aberration means is configured to act on [[an]] the input radiation wavefront ~~shape~~ to produce first and second output radiation signals that are distorted images of the input radiation wavefront,

wherein the detection means detects the first and second radiation signals and in response thereto causes the output device to provide an output signal relating to the shape of the input radiation wavefront.

2. (Currently Amended) A measuring apparatus as claimed in claim 1 wherein the ~~aberrating~~ aberration means creates at least two filter functions, the filter functions being a complex conjugate pair.

3. (Canceled)

4. (Currently Amended) A measuring apparatus as claimed in claim 1 further including a wavefront modulator coupled to the output device such that the wavefront modulator is distorted to provide a correction to a non-planar input radiation wavefront.

5. (Original) A measuring apparatus as claimed in claim 4 wherein the wavefront modulator is configured to transform a wavefront being describable by means of a complex function into a wavefront being describable by a real function.

6. (Currently Amended) A measuring apparatus as claimed in claim 1 wherein the output device is provided with ~~the~~ calculation means for calculating a difference between the first and second radiation signals.

7. (Previously Presented) A measuring apparatus as claimed in claim 1 wherein the radiation sensitive surface of the detection means is provided with elements that allow the measurement of radiation intensity at different points across the surface of the detection means.

8. (Currently Amended) A measuring apparatus as claimed in claim 6 wherein the ~~output device is provided with the~~ calculation means ~~for calculating~~ calculates the difference between the first and second radiation signals at different points across the surface of the detection means.

9. (Canceled)

10. (Currently Amended) A measuring apparatus as claimed in claim 1 wherein the ~~aberration~~ filter function is a weighted sum of Zernike polynomials arranged to equalise [[the]]a signal generated from each mode of deformation in the input wavefront according to [[the]]an expected statistical distribution of such modes in the

input radiation wavefront.

11. (Currently Amended) A measuring apparatus as claimed in claim [[1]]2, wherein the aberration means is arranged such that the complex conjugate ~~aberration~~ filter functions of the aberration means are associated with diffraction orders of the same order but having different signs.

12. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals are produced simultaneously.

13. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals are produced sequentially.

14. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a diffractive optical element.

15. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a variable-shape optical mirror.

16. (Previously Presented) A measuring apparatus as claimed in claim 1, wherein the aberration means is a variable refractive index device.

17. (Original) A measuring apparatus as claimed in claim 16 wherein the variable refractive index device is a liquid crystal phase modulator used sequentially to provide complex conjugate aberrations.

18. (Canceled)

19. (Currently Amended) A method for determining data relating to the shape

of an input radiation wavefront, the wavefront shape being describable at a pre-determined location in an optical system, the method comprising:

transmitting said input radiation wavefront through an aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry, wherein the aberration means acts on the input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront;

detecting [[the]] an intensity of ~~incident radiation on a surface~~ the first and second radiation signals; and

sending the detected intensity to an output device that in response thereto provides the data relating to the shape of the input radiation wavefront ~~a measure of the intensity of the incident radiation;~~

~~wherein the aberration means acts on any input wavefront shape to produce first and second output radiation signals that in combination provide data from the output device~~.

20-26. (Cancelled)

27. (Currently Amended) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry, wherein the aberration means is configured to act on the input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront; and

detection means having a radiation sensitive surface ~~capable of detecting the intensity of incident radiation on the surface~~ adapted to detect the first and second radiation signals; and

an output device coupled to an output of the detection means and in response

thereto outputs an output signal indicating the shape of the input radiation wavefront; ~~wherein the aberration means is configured to act on an input wavefront shape to produce first and second output radiation signals that in combination produce an output signal from the output device~~.

28. (Previously Presented) The measuring apparatus of claim 27, further comprising a wavefront modulator coupled to the output signal of the output device to modulate the input radiation wavefront in response thereto.

29. (Previously Presented) A measuring apparatus as claimed in claim 27, wherein the output signal from the output device indicates an extent to which the wavefront shape is non-planar, and wherein when the wavefront shape is planar, the output signal is substantially zero.

30. (Currently Amended) A measuring apparatus as claimed in claim 1, wherein the first and second output radiation signals, in combination, provide data from the output device [[on]] indicating an extent to which the wavefront shape is non-planar.

31. (Previously Presented) A measuring apparatus as claimed in claim 1 wherein the filter function is non-quadratic.

32. (Currently Amended) A measuring apparatus for determining data relating to the shape of an input radiation wavefront, the wavefront shape being describable at a pre-determined location in an optical system, the apparatus comprising:

aberration means, the shape of which is defined by a filter function, the filter function having a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry, wherein the aberration means is configured to act on the input radiation wavefront to produce first and second output

radiation signals that are distorted images of the input radiation wavefront; and

detection means having a radiation sensitive surface ~~capable of detecting the intensity of incident radiation on the surface~~ adapted to detect the first and second radiation signals, the detection means being coupled to an output device that provides ~~a measure of the intensity of the incident radiation~~ an output signal relating to the shape of the input radiation wavefront;

~~wherein the aberration means is configured to act on an input wavefront to produce first and second output radiation signals, and~~

~~wherein the filter function comprises a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry~~.

33. (Previously Presented) A measuring apparatus as claimed in claim 32 wherein the filter function is complex valued and has non-mixed symmetry.

34. (New) The measuring apparatus as of claim 1, wherein the output signal indicates an extent to which the wavefront shape is non-planar, and wherein when the wavefront shape is planar, the output signal is substantially zero.

35. (New) The method of claim 19 wherein the filter function is non-quadratic.

36. (New) The measuring apparatus as of claim 32, wherein the filter function is non-quadratic.

37. (New) The measuring apparatus as of claim 32, wherein the output signal indicates an extent to which the wavefront shape is non-planar, and wherein when the wavefront shape is planar, the output signal is substantially zero.